

Alcohol Saliva Strip Test

MADHUSUDHANA RAO THOKALA¹, SHYAM PRASAD REDDY DORANKULA²,
KEERTHI MUDDANA³, SUREKHA REDDY VELIDANDLA⁴

ABSTRACT

Alcohol is a factor in many categories of injury. Alcohol intoxication is frequently associated with injuries from falls, fires, drowning, overdoses, physical and sexual abuse, occupational accidents, traffic accidents and domestic violence. In many instances, for forensic purpose, it may be necessary to establish whether the patients have consumed alcohol that would have been the reason for the injury/accidents. Combining rapidity and reliability, alcohol saliva strip test (AST) has been put forward for the detection of alcohol in saliva for blood alcohol concentration (BAC).

Keywords: Alcohol, Saliva, BAC, AST, Forensic aid

INTRODUCTION

Now a days alcohol-attributable injuries and violence are of growing concern as alcohol is a factor in many categories of injury [1]. Each year it is responsible for about 2.3 million premature deaths worldwide. Injuries – both unintentional and intentional – account for more than a third of the burden of disease attributable to alcohol consumption. These include injuries from road traffic crashes, burns, poisoning, falls and drowning as well as violence against oneself or others. The impact of alcohol-related injuries affects not only those who are intoxicated at the time of injury occurrence, but also those who fall victim to their behavior [2,3]. Alcohol consumption has been steadily increasing in developing countries like India and decreasing in developed countries since the 1980's [4]. At a snapshot, the scenario of alcohol consumers in India stands at greater than 62.5 millions during 1970's that has increased by 106.7% over the 15-year period from 1970 to 1996 and continues to increase at the same pace to the present [5-7].

People drink at an earlier age than previously. The mean age of initiation of alcohol use has decreased from 23.36 years in 1950 to 1960 to 18.45 years in 2010. Changing social norms, urbanization, increased availability, high intensity mass marketing and relaxation of overseas trade rules along with poor level of awareness related to alcohol has contributed to increased alcohol use. This alcohol use was associated with 94% of incidents of self harm, 54% of non-specific, 47% of collapses, 50% of assaults, and 50% of patients admitted to hospital [5-7]. In many instances, for investigation purpose, it may be necessary to establish whether the patients/subjects have consumed alcohol that would have been the reason for the injury/accidents.

The blood alcohol concentration (BAC) is a direct measure of the alcohol level for various purposes like forensic, work place, medical and research settings; and several new technologies have been developed for estimating the same. The most preferable method for quantitative measurement of alcohol is gas chromatography for whole blood. However it is time consuming, expensive and requires skills in laboratory techniques. To date, noninvasive methods for quantitatively estimating BAC have primarily used breath testing/breath meters. Although a breath analyzer provides a rapid result, it requires calibration on a regular basis and patient cooperation which may be difficult in combative or comatose patients [8]. Combining rapidity and reliability, alcohol saliva strip test (AST) has been put forward for the determination of blood alcohol concentration (BAC)

by detecting alcohol in saliva which can be helpful in forensic investigations as an aid.

Alcohol Saliva Strip

Alcohol saliva strip contains Tetramethylbenzidine (TMB) 0.12mg, Alcohol Oxidase 0.5 IU, Peroxidase 0.35 IU and Proteins 0.15mg.. The AST strip is based on the high specificity of alcohol oxidase (ALOX) for ethyl alcohol in the presence of peroxidase and enzyme substrate such as tetramethylbenzidine (TMB) as shown in the following:

$\text{EtOH} + \text{TMB} \xrightarrow{\text{ALOX/Peroxidase}} \text{CH}_3\text{CHO} + \text{Colored TMB}$

The distinct color on reactive pad can be observed in less than 20 seconds after the tip is contacted with saliva samples with the ethyl alcohol concentration greater than 0.02% [9].

The present paper concludes and recommends alcohol saliva strip test (AST) for the determination of BAC of 0.02% or higher via saliva that is unique in providing on-the-spot, quantitative results. The AST has few limitations, such as: the AST strip is designed for use with human saliva only; a positive result indicates only the presence of alcohol and does not indicate or measure intoxication, and there is a possibility that technical or procedural errors, as well other substances in certain foods and medicines may interfere with the test and cause false results. But still the AST has good reliability and validity for the non-invasive, quantitative estimation of BAC and has an edge over the other methods. The advantages of this method are as follows: 1) the AST results are not influenced by the presence of blood in the oral cavity, 2) the non invasive nature of AST minimizes the risk of needle stick injuries for staff and multiple needle punctures for patients, 3) AST provides a determination of the BAC within 5 minutes and 4) it could also be used in determining postmortem saliva ethanol levels. Last but not the least, because of the relatively low cost of the AST, the saliva test could be a cost-effective alternative in public health settings where mildly to moderately intoxicated persons are encountered [9,10].

REFERENCES

- [1] Becker B, Woolard R, Nirenberg T. Alcohol use among sub critically injured emergency department patients. *Acad Emerg Med.* 1995; 2:784-90.
- [2] Glucksman E. Alcohol and accidents. *Br Med Bull.* 1994; 50:76-84.
- [3] Cherpitel C.J. Alcohol and injuries: a review of international emergency room studies. *Addiction.* 1993; 88:923-37.
- [4] World Health Organization, Global Status Report on Alcohol. 2004.
- [5] Ministry of Social Justice and Empowerment. United Nations Office of Drug

- and Crime Regional office of south Asia, The extent, pattern and trends of drug abuse in India. 2004.
- [6] Ministry of Social Justice and Empowerment. United Nations Office of Drug and Crime Regional office of south Asia, Drug Abuse Monitoring System profile of treatment seekers. 2004.
- [7] Ranganathan TT, Alcohol related harm in India- a fact sheet. *Clinical Research Foundation*. 2006.
- [8] Gibb KA, Yee AS, Johnston CC, Martin SD, Nowak RM. Accuracy and usefulness for a breath alcohol analyzer. *Ann Emerg Med*. 1984; 13(7):516-20.
- [9] Catalog, Instant alcohol saliva test strip, Chematics, North Webster, IN, USA, 2009.
- [10] Bates ME, Brick J, White H. The correspondence between saliva and breath estimates of blood alcohol concentration: advantages and limitations of the saliva method. *J Stud Alcohol*. 1993; 54:17-22

PARTICULARS OF CONTRIBUTORS:

1. Reader, Department of Oral and Maxillofacial Pathology, Kamineni Institute of Dental Sciences, Narketpally, Nalgonda, India.
2. Senior Lecturer, Department of Oral and Maxillofacial Pathology, Kamineni Institute of Dental Sciences, Narketpally, Nalgonda, India.
3. Senior Lecturer, Department of Oral and Maxillofacial Pathology, Kamineni Institute of Dental Sciences, Narketpally, Nalgonda, India.
4. Senior Lecturer, Department of Oral and Maxillofacial Pathology, MNR Dental College & Hospital, MNR nagar, Sasalwadi, Sanga Reddy, Medak, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Shyam Prasad Reddy Dorankula,
Senior Lecturer, Department of Oral and Maxillofacial Pathology, Kamineni Institute of Dental Sciences,
Narketpally, Nalgonda. Andhra pradesh -508254, India.
Phone: 09966183199 E-mail: shyamprasadreddy_d@yahoo.co.in

Date of Submission: **Dec 01, 2013**Date of Peer Review: **Jan 11, 2014**Date of Acceptance: **Feb 21, 2014**Date of Publishing: **Mar 15, 2014****FINANCIAL OR OTHER COMPETING INTERESTS:** None.